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The Larva of *Ammatomus icarioides* (Turner) (Hymenoptera: Sphecidae, Nyssoninae)

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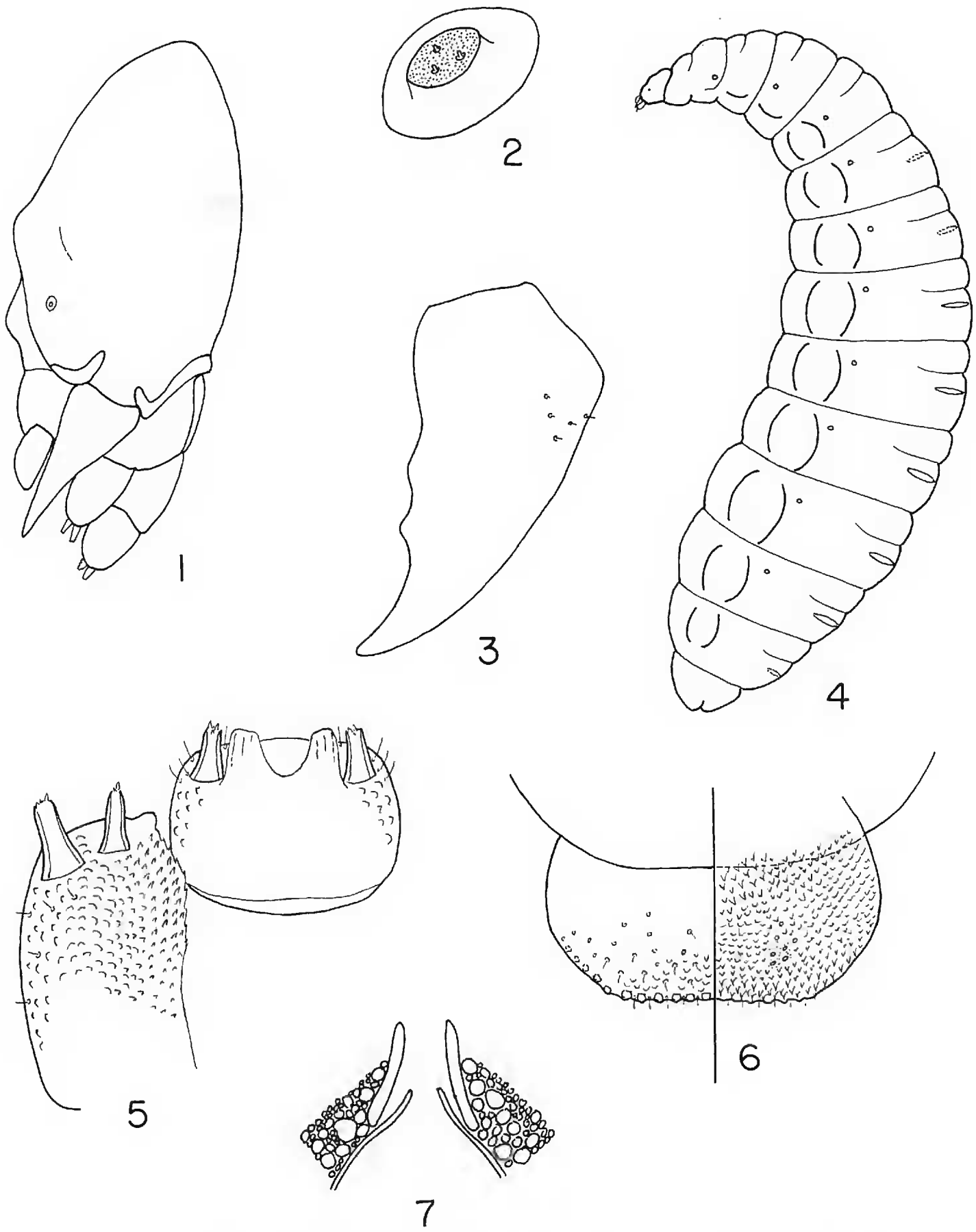
There are few groups of insects more rewarding to ethologically inclined biologists than digger wasps. They were favorites of Fabre, and since his time they have been the subject of innumerable books and scientific papers. Yet for many years Sphecidae were taxonomically a forbidding group, in which accurate species identifications were hard to come by and the higher classification fraught with difficulties. Problems still exist, and perhaps always will, but the picture has changed dramatically for the better, thanks in large part to Richard Bohart and the many students he has trained. The rewards of this research and teaching will be reaped for many years in terms of increased depth of knowledge of these most elegant of insects.

The present paper purports to fill only a tiny gap in our understanding of sphecid phylogeny. In fact it poses a puzzle, for the larvae of *Ammatomus* have several unusual features which tend to contradict evidence from ethology and from adult structure. Nesting data (Hook, 1981) suggest that *Ammatomus icarioides* is a fairly typical member of the tribe Gorytini, while adult morphology suggests that it belongs to a complex of gorytine genera (including *Sphecius, Kohlia,* and others) having a rather robust thorax, approaching the Stizini (Bohart and Menke, 1976).

This study is based on seven larvae from Brisbane, Queensland, Australia, taken by Allan Hook in his recent biological study. Several cocoons from this study were also available. Voucher specimens have been placed in the Colorado State University Collections. Associated adults were identified by comparison with the type specimen in the British Museum (Natural History).

DESCRIPTION OF MATURE LARVA
(Figs. 1–7)

Body length 16 mm; maximum width 4.2 mm (Fig. 4). Integument smooth and largely devoid of setae and spines, although under high magnification scattered minute setae and surface granules can be detected. Each body segment divided dorsally into two annulets by a transverse crease, the most posterior annulet with a pair of weakly defined transverse welts; pleural lobes well developed; anus terminal. Ten pairs of equally developed spiracles present; atria lined with hexagonal cellules; opening into subatrium armed with a circlet of spines. Maximum width of head 1.04 mm; length to apex of clypeus 1.08 mm, to apex of labrum 1.3 mm. Front of head with five somewhat nipple-shaped callosities, three of them in a series just below and mesad of antennae, two somewhat above antennae (these callosities are slightly brownish in color in two specimens, unpigmented in the other five). In lateral view (Fig. 1) only two of these callosities are visible. Coronal suture distinct; parietal bands indicated by short, unpigmented streaks.



Figs. 1–7. *Ammatomus icarioides*. 1–6, mature larva; 7, cocoon. 1, head, lateral view. 2, antenna. 3, mandible. 4, body, lateral view. 5, labium and maxilla, oral aspect. 6, labrum (left half) and epipharynx (right half). 7, diagrammatic cross section of cocoon pore.

Antennal orbits small, circular, containing a circular brown area in the center; this brown disc is slightly elevated above the membrane of the orbit and bears three small sensilla (Fig. 2). Head with scattered punctures, some of which bear minute setae no more than 3 times as long as width of puncture; clypeus with 24 punctures in lateral groups of 12 each.

Labrum 0.43 mm wide, apical margin straight, with a row of 22 small sensory cones; surface strongly convex, with 20 punctures on each side, most of them bearing short setae; apical margin also with several setae; surface papillose medioapically (Fig. 6). Epipharynx strongly spinulose, sensory areas each with 7 pores. Mandibles 2.1 times as long as their greatest width, weakly tridentate, each with 5 punctures toward the base laterally, punctures bearing minute setae (Fig. 3). Maxillae with small setae laterally, extensively papillose but papillae grading into small spinules on mesal margin; palpi and galeae prominent, palpi slightly longer and stouter than galeae (Fig. 5). Labial palpi equal in length to galeae, but somewhat stouter; spinnerets paired, not exceeding palpi; labium with several prominent apical setae.

Discussion

Although the nesting biology of *Ammatomus icarioides* appears to differ in no important ways from that of *Gorytes* and related genera, the larva will not key readily to Gorytini in either the artificial key of Evans (1959) or the tables of Evans and Lin (1956). This is because of the absence of a distinct antennal papilla and the five protuberances on the front of the head. These protuberances are not as distinct as in Alyssonini and Nyssonini, but they are better developed than the "two pairs of vertical depressions" and the resulting interspaces described for *Gorytes.* The unusual antennae are difficult to explain. They appear to represent a stage between the development of a true papilla and the presumably ancestral condition, in which the sensilla merely arise from the membrane of the orbits.

The cocoons provide no assistance in solving this puzzle. As noted by Hook (1981), there is a single pore with a raised rim at one end. This is actually at the posterior end, opposite the cap, and resembles the pore in the cocoon of *Gorytes,* as figured by Evans (1966). This pore penetrates both the outer and inner layers of the cocoon and has a thickened rim (Fig. 7). It may represent a precursor of the more elaborate pores of *Sphecius* and of Bembicini, which are distributed around the widest part of the cocoon. In any case, there seem to be no important differences between the cocoons of *Ammatomus* and those of *Gorytes.*

We are left with the conclusions that the larvae of *Ammatomus* have probably been subjected to somewhat different selection pressures than those of other Gorytini and that the genus perhaps stands somewhat farther apart phylogenetically from *Gorytes* and from *Sphecius* than usually recognized.

Literature Cited

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